

# Lake Ronkonkoma Advisory Board Meeting February 25, 2014

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and Ronald Busciolano  
U.S. Geological Survey

# Tonight's presentation

- Who we are: USGS role and monitoring network
- Hydrologic cycle—Long Island aquifer system—wells and water levels
- Pilot groundwater-quality study

# Mission of the U.S. Geological Survey

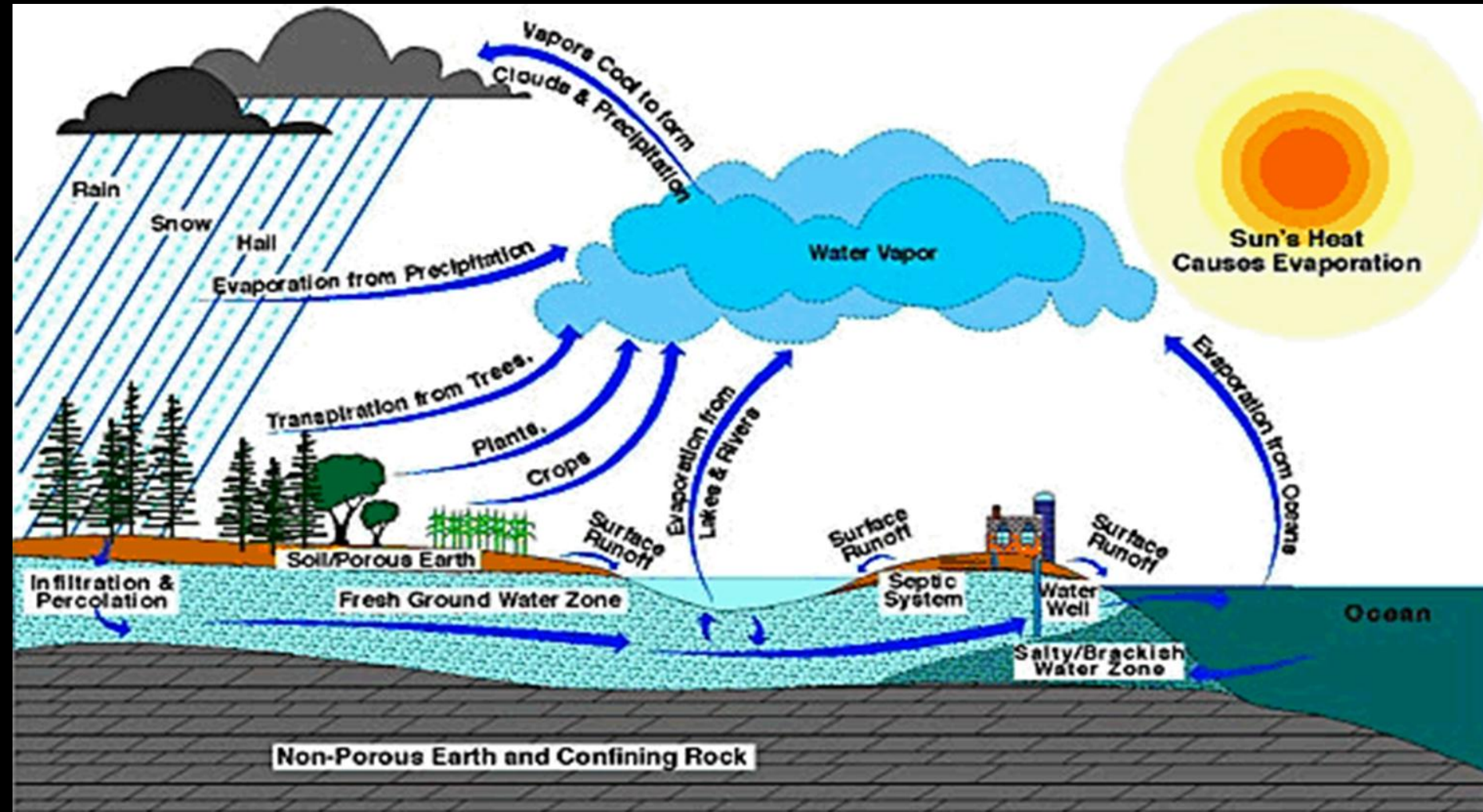
- The USGS provides the Nation with reliable information about the Earth to:
  - minimize the loss of lives and property from natural disasters
  - manage biological, water, mineral, and energy resources
  - enhance and protect the quality of life
  - contribute to wise economic and physical development

# Role of the U.S. Geological Survey

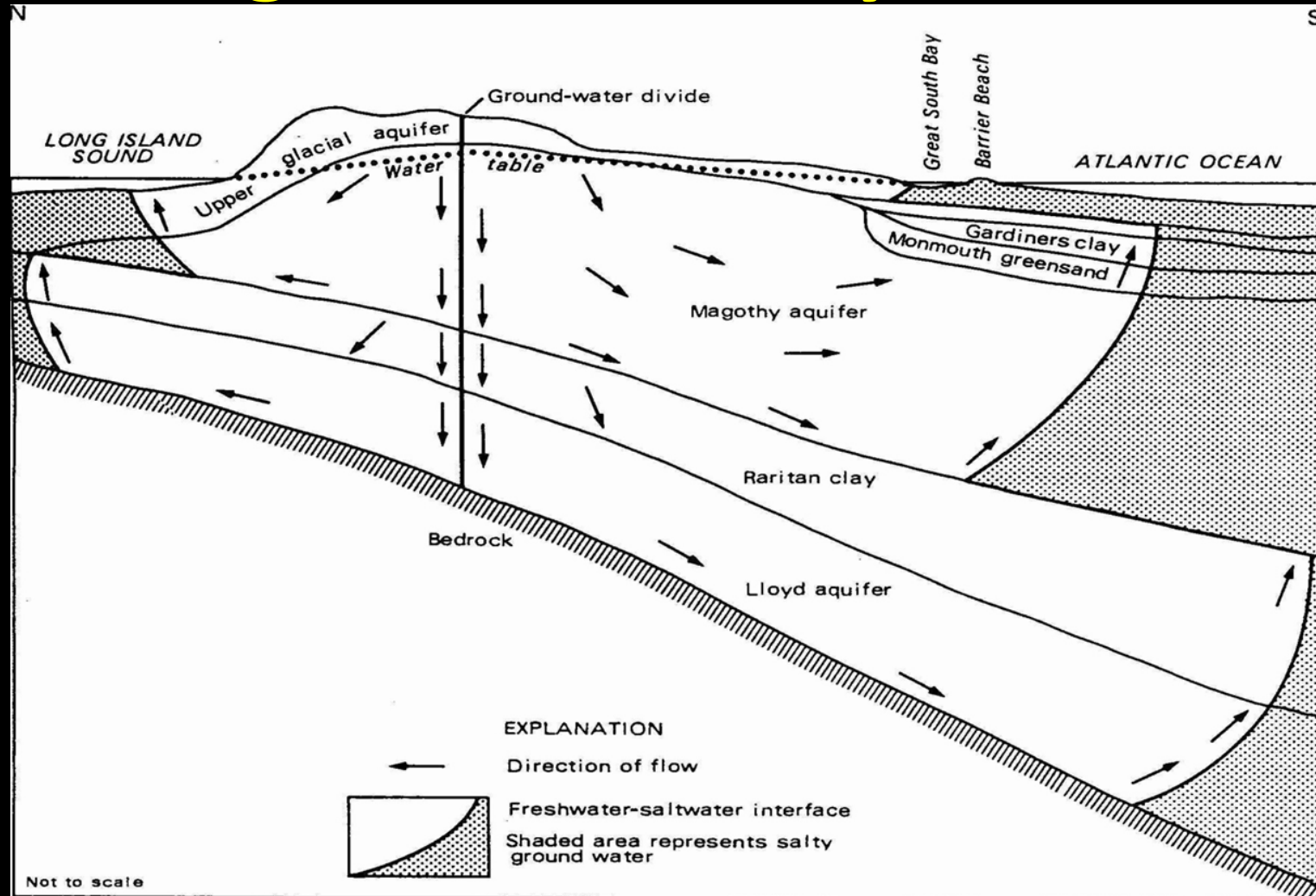
- Collect hydrologic data using standardized instruments and procedures, which contributes to a nationally consistent data set.
- Create a set of hydrologic data suitable for use in evaluating natural and human-induced changes in Long Island's aquifer system.
- Provide local managers and regulators with data and analysis useful in designing programs to protect aquifers, watersheds, biota, and sensitive aquatic habitats.



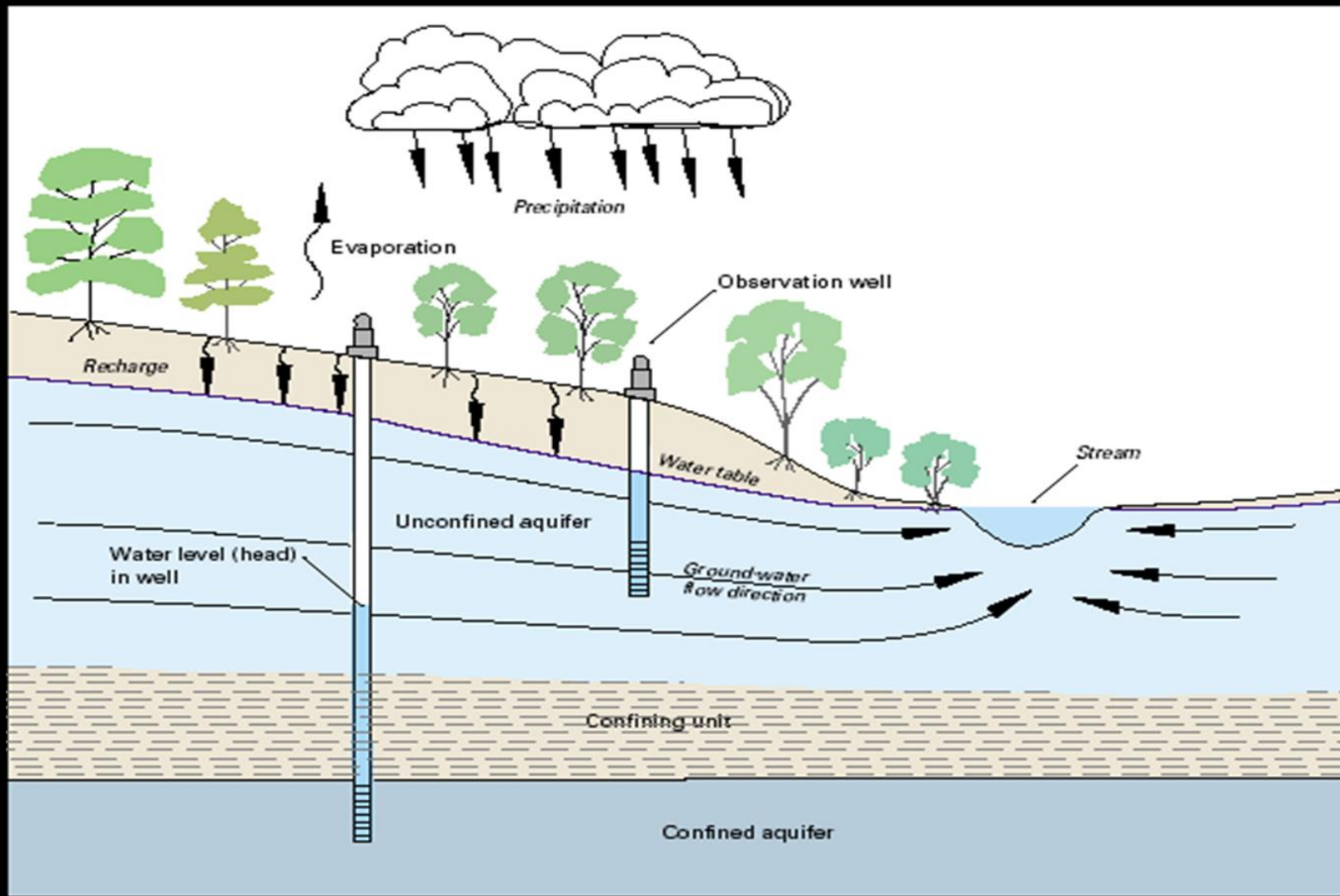
# The Hydrologic Cycle



# Generalized cross-section of groundwater system

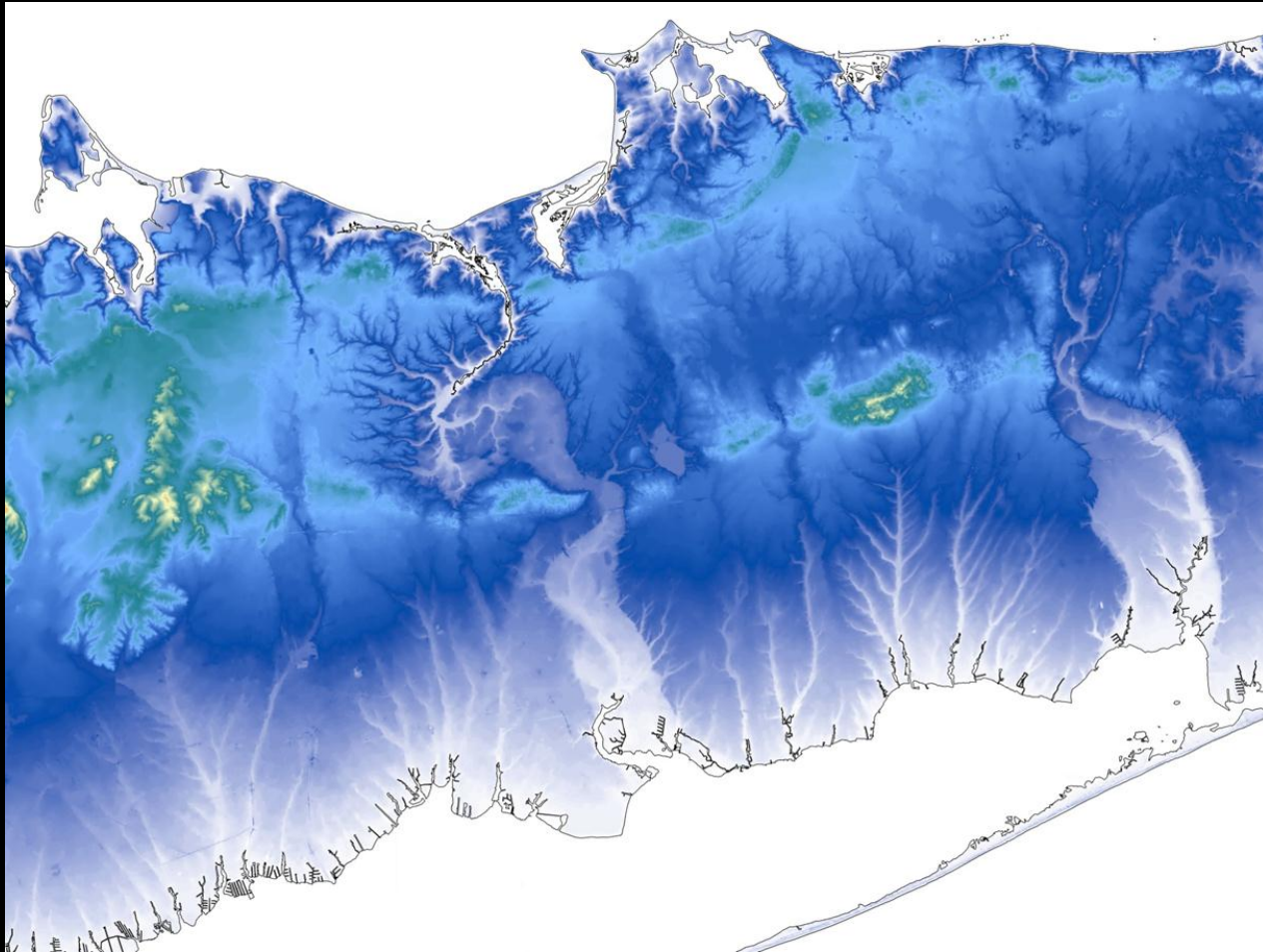


# What are wells and water levels



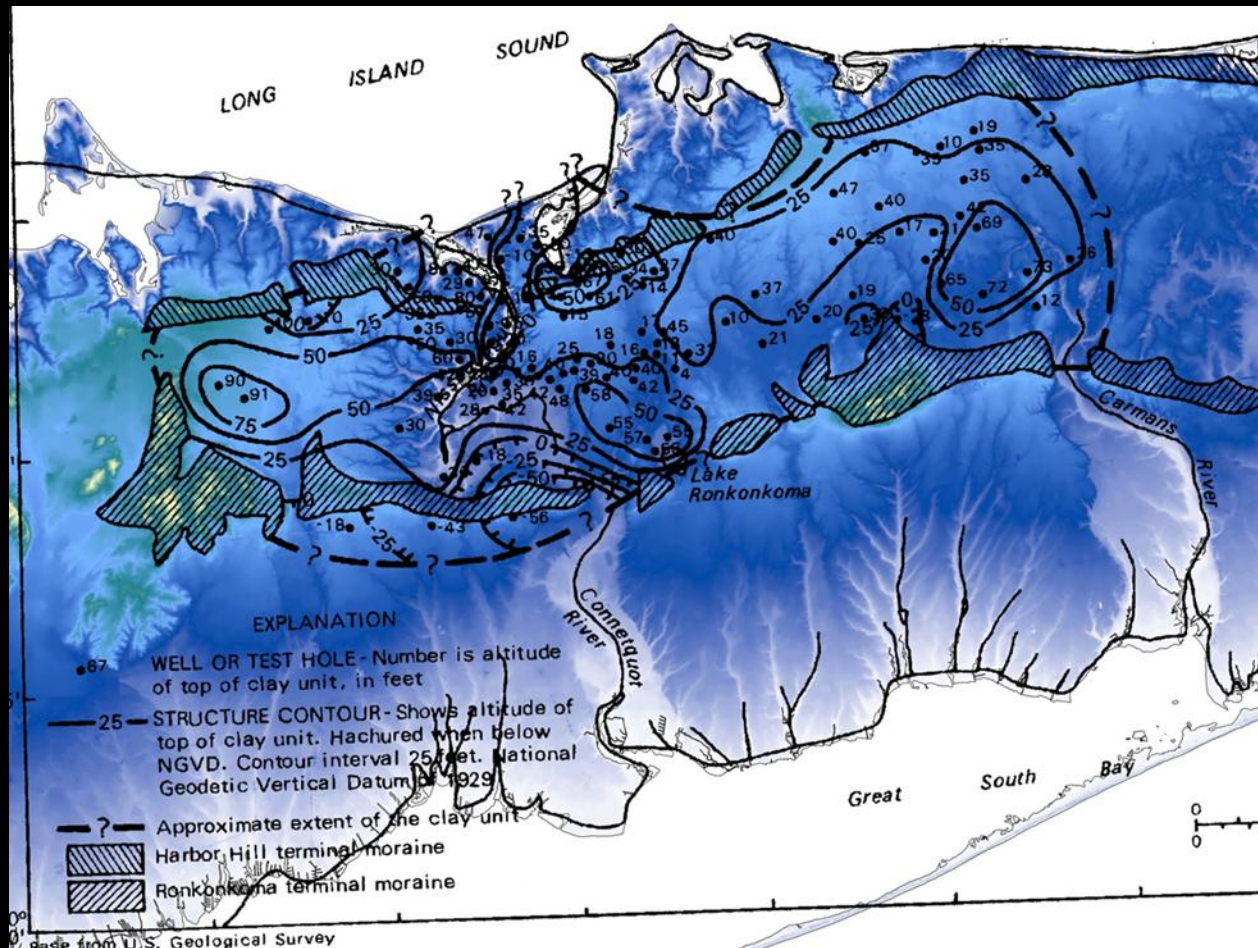


# 10 Meter Digital Elevation Model

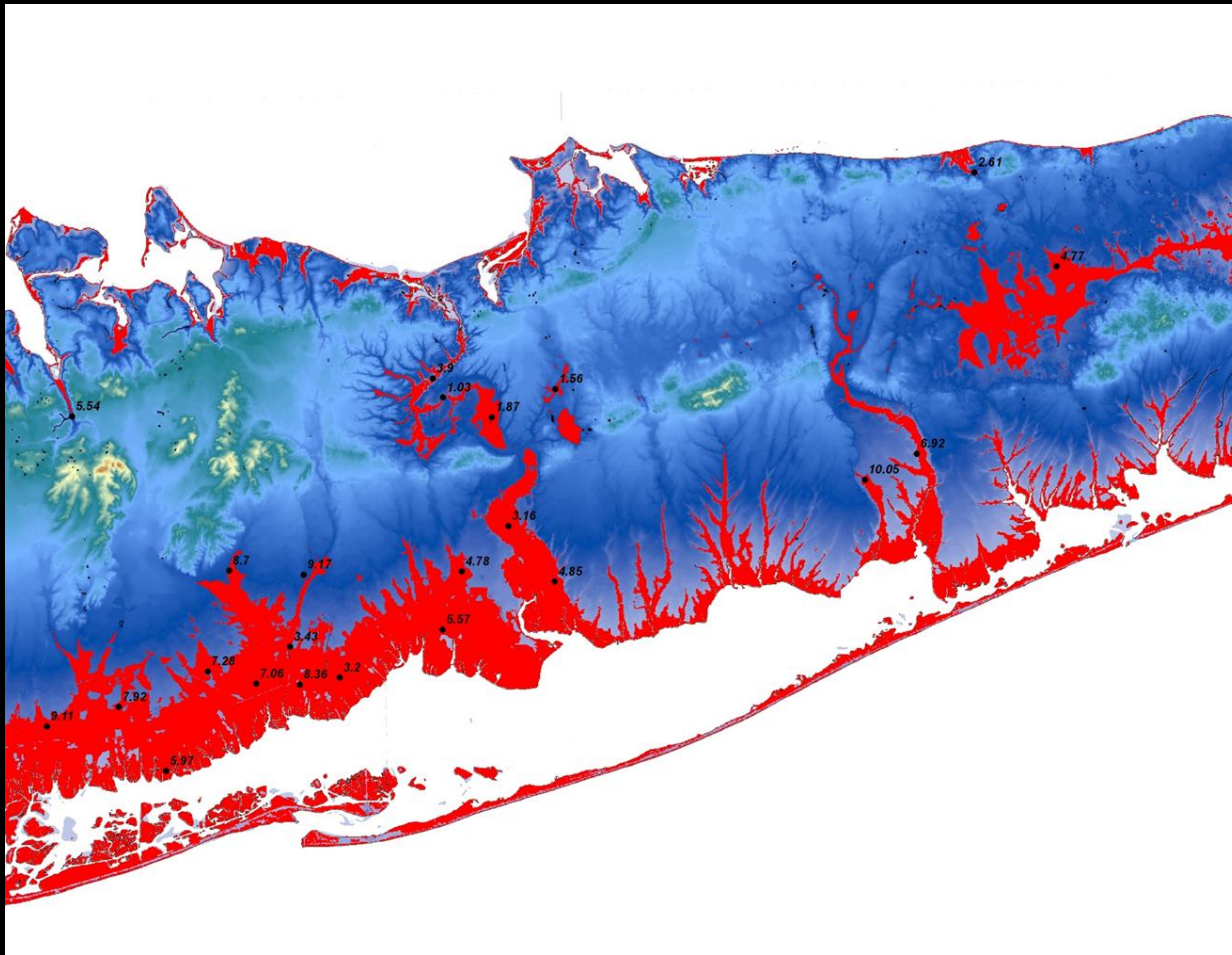




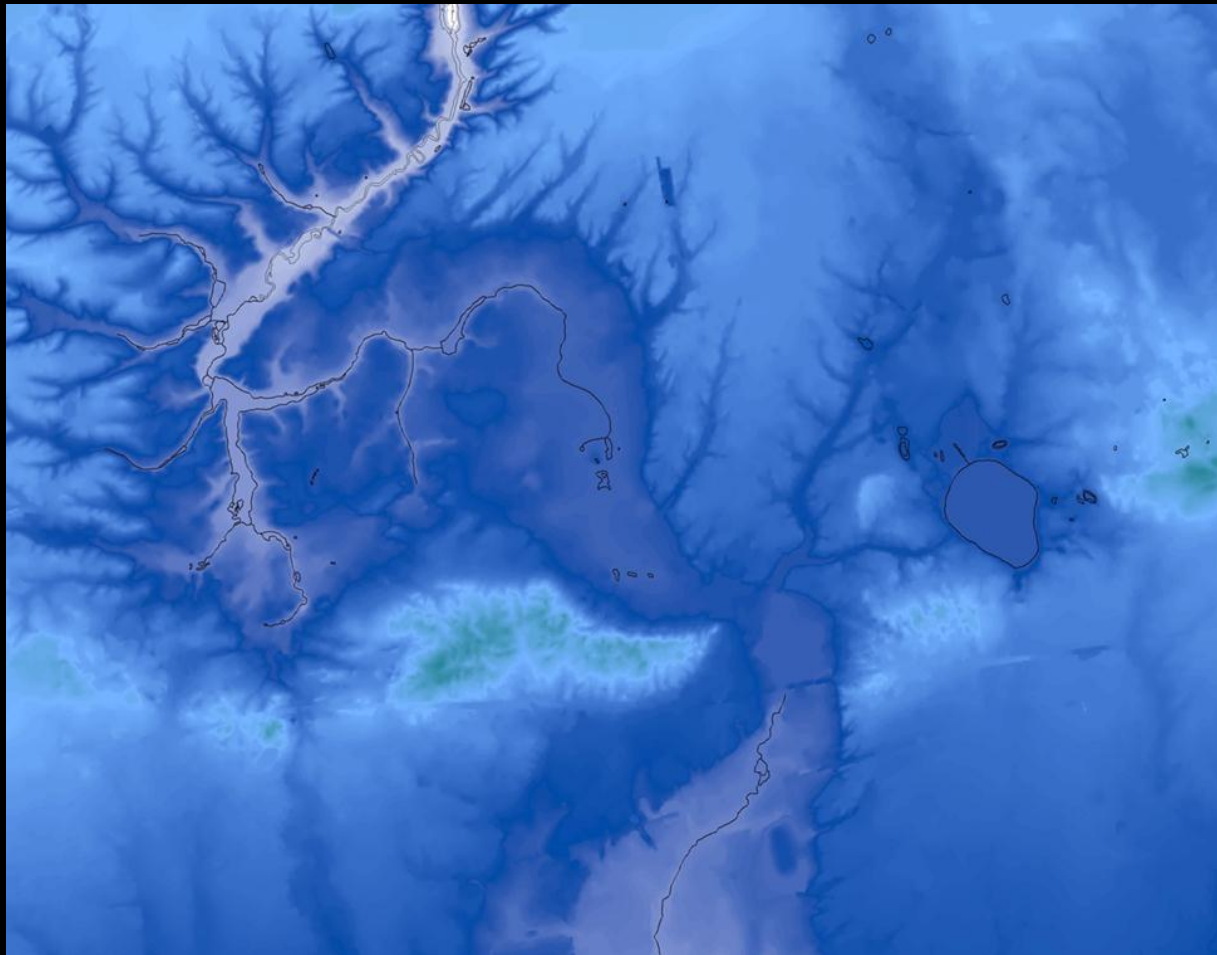
# 10 Meter Digital Elevation Model with Smithtown Clay



# Red areas are <10 feet to water “Provisional”

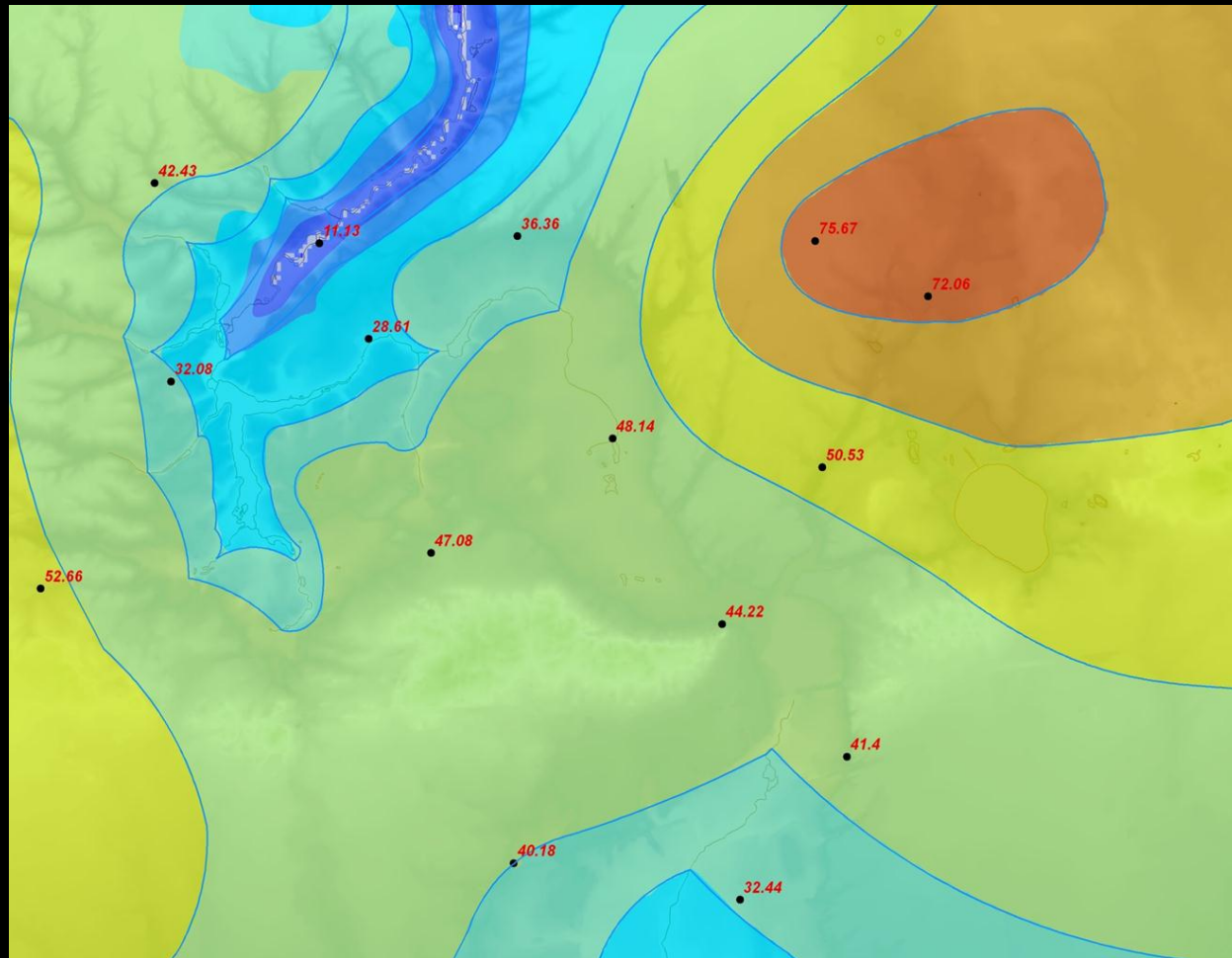


# 10 Meter Digital Elevation Model



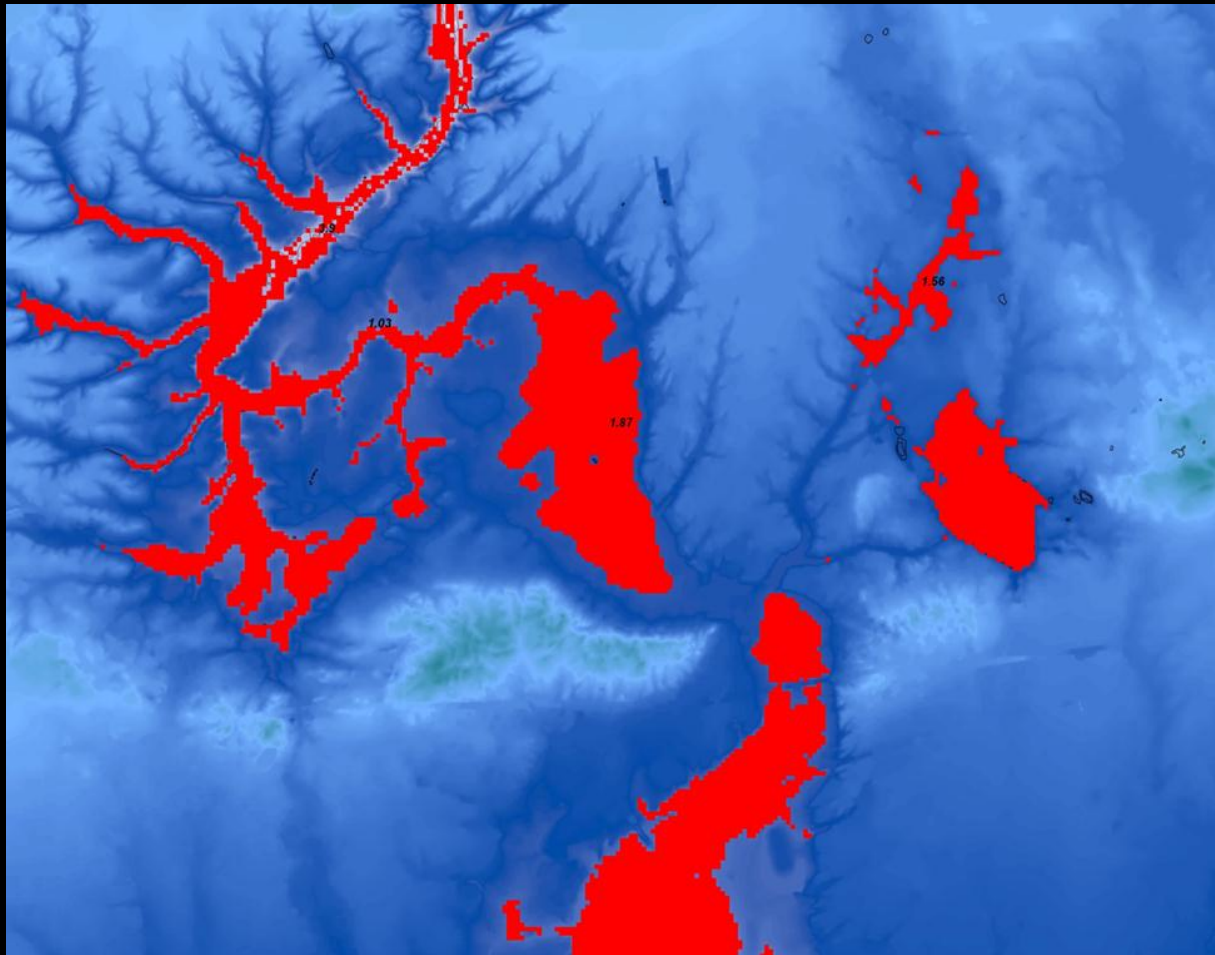


# Shallow Groundwater Table

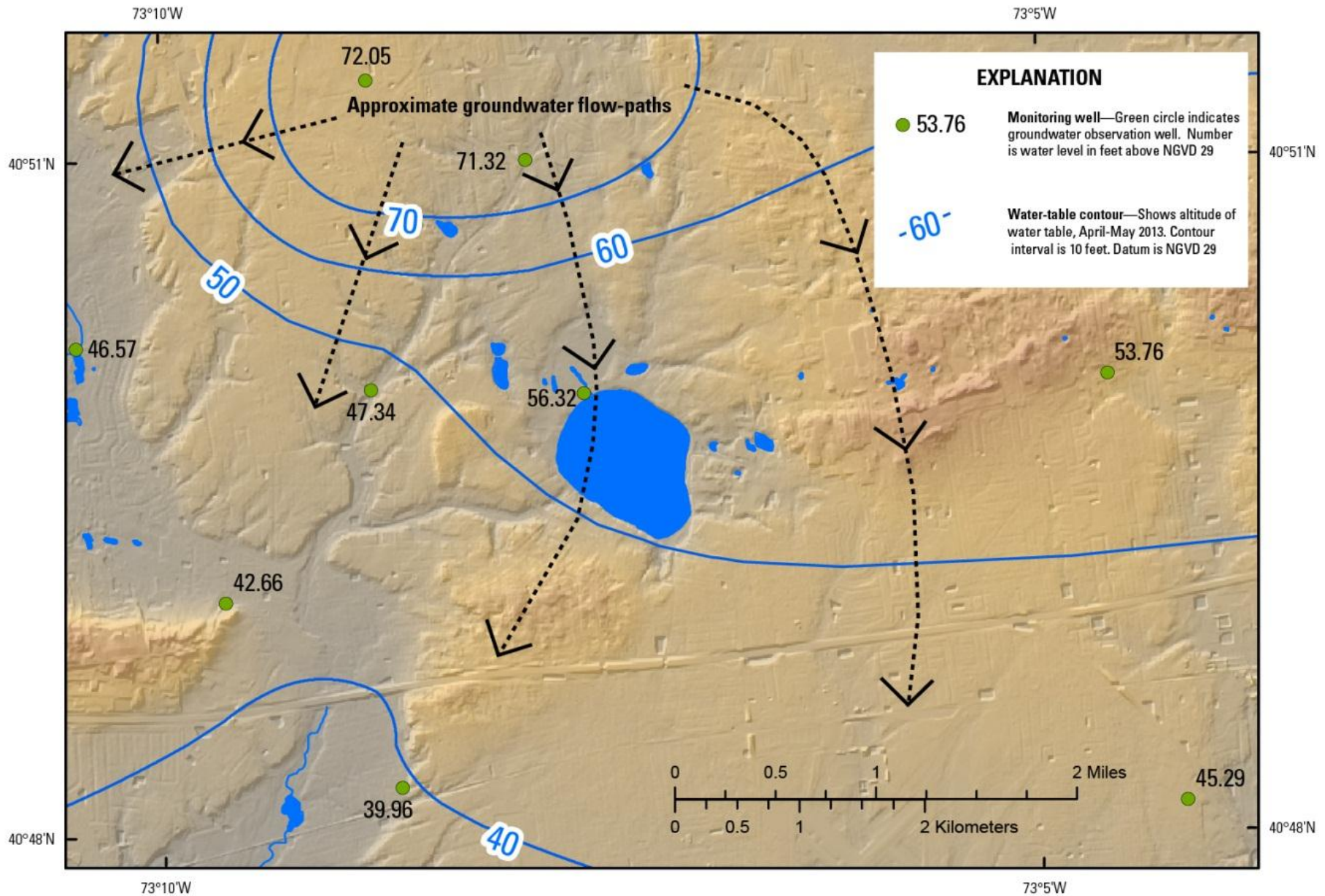




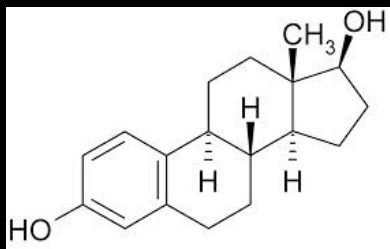
**Red areas are <10 feet to water**  
**“Provisional”**



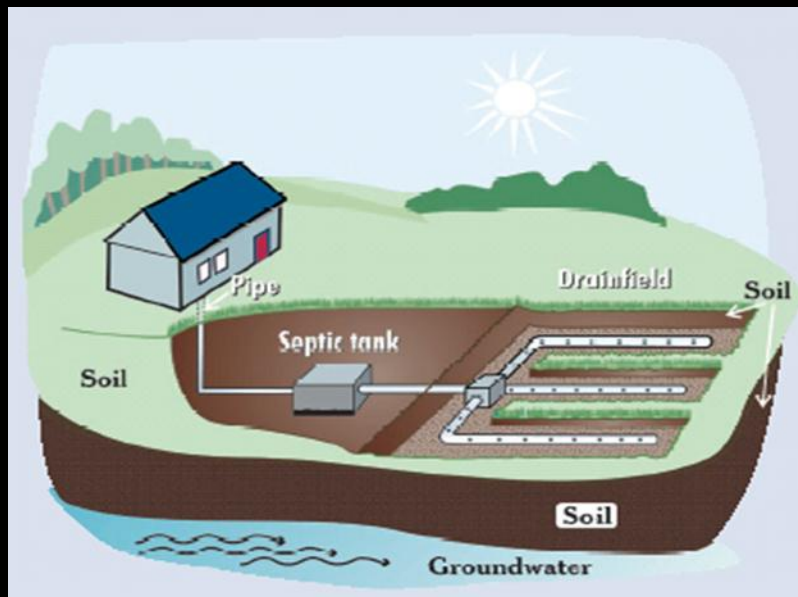
PROVISIONAL DATA -- SUBJECT TO REVIEW



PROVISIONAL DATA -- SUBJECT TO REVIEW



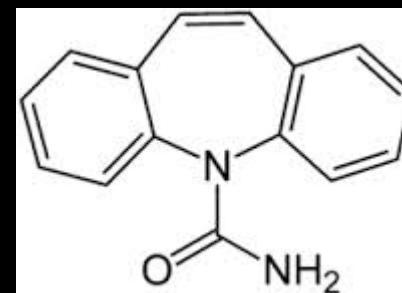
estradiol



caffeine



sulfamethoxazole



carbamazepine

# EMERGING CONTAMINANTS



# Groundwater Transport on Long Island

- Sandy soil, relatively high hydraulic conductivity
- Chemical structure determines transportability through aquifer

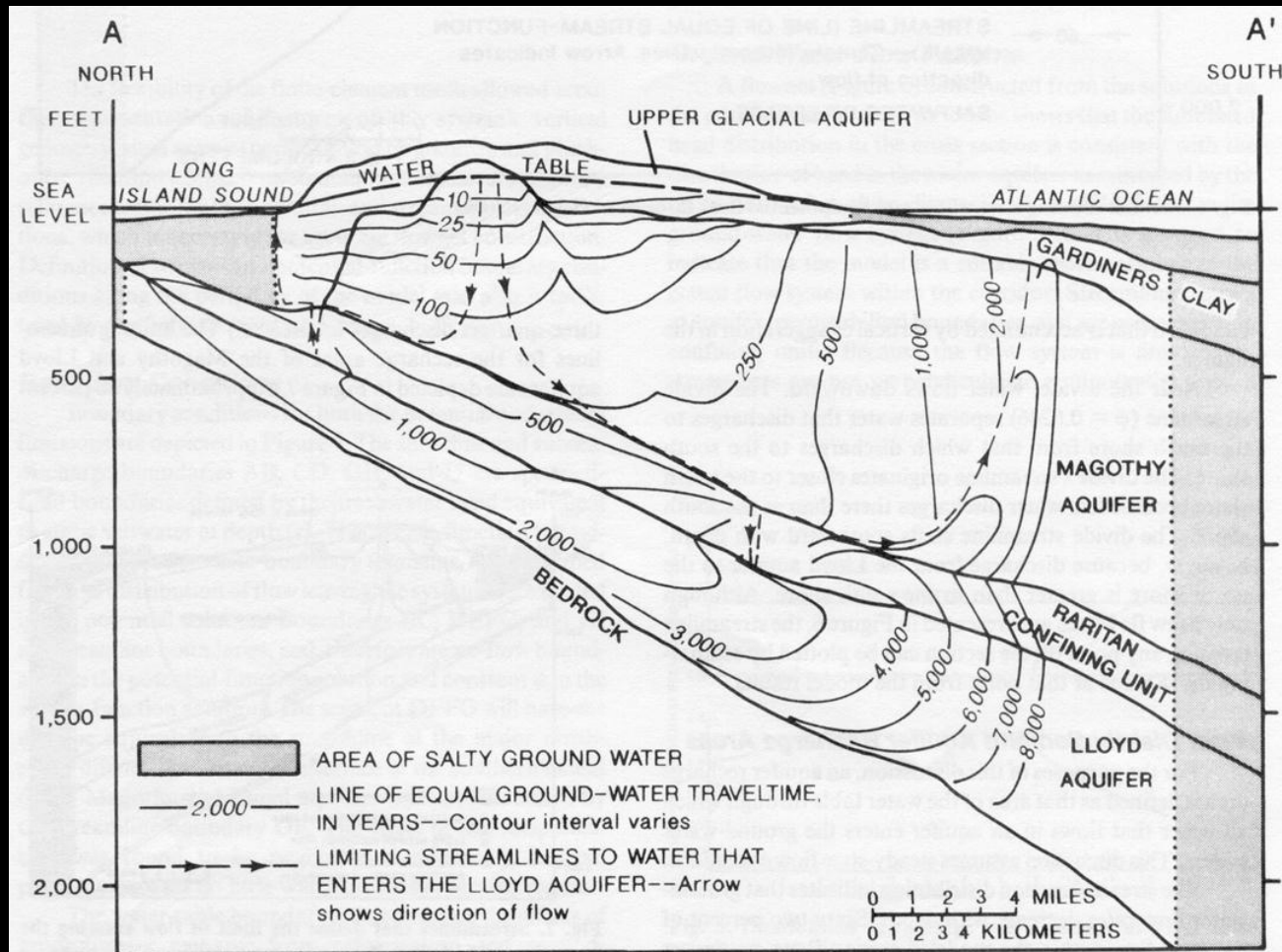
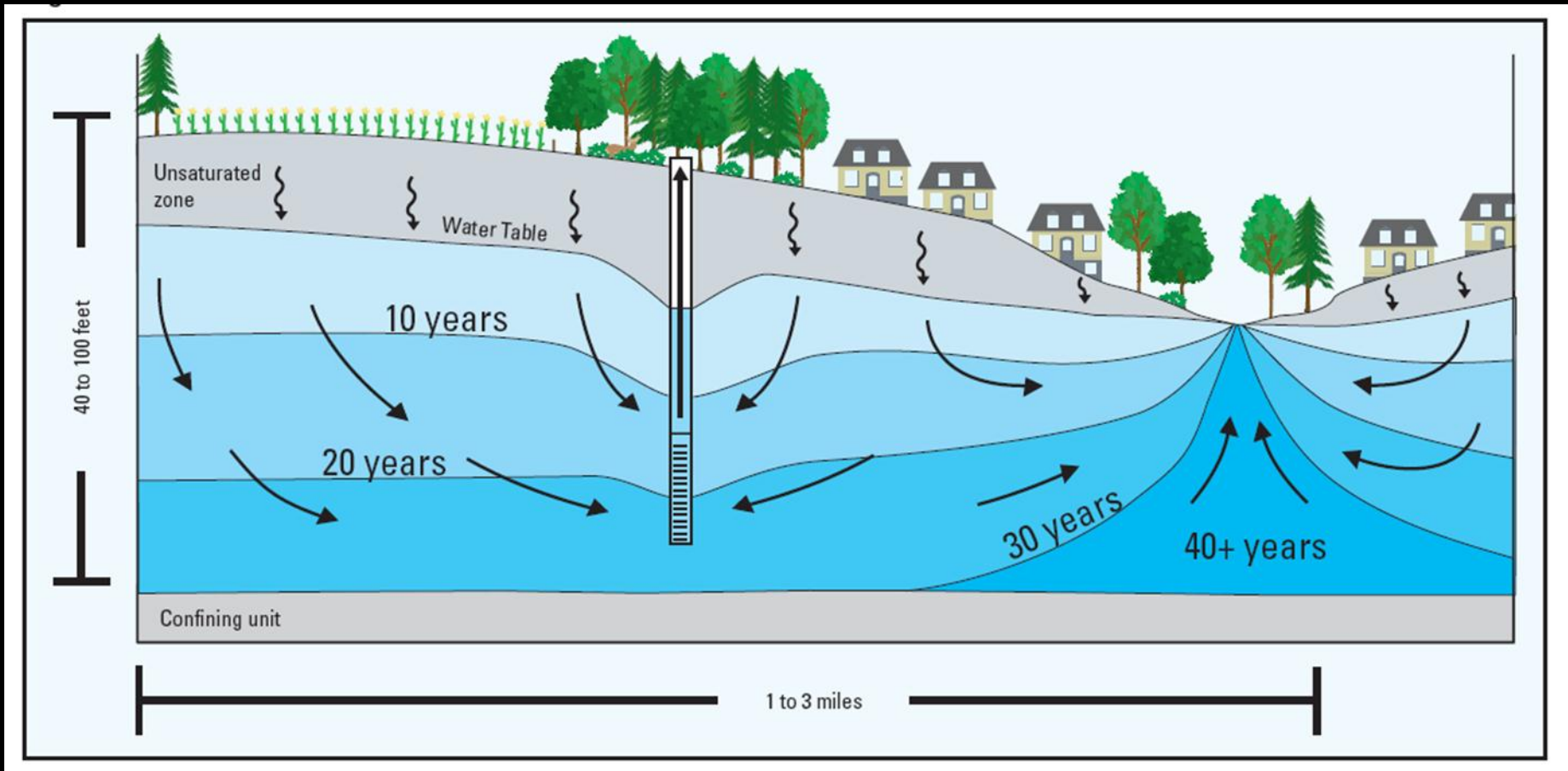


Fig. 8. Distribution of ground-water traveltime within modeled section.

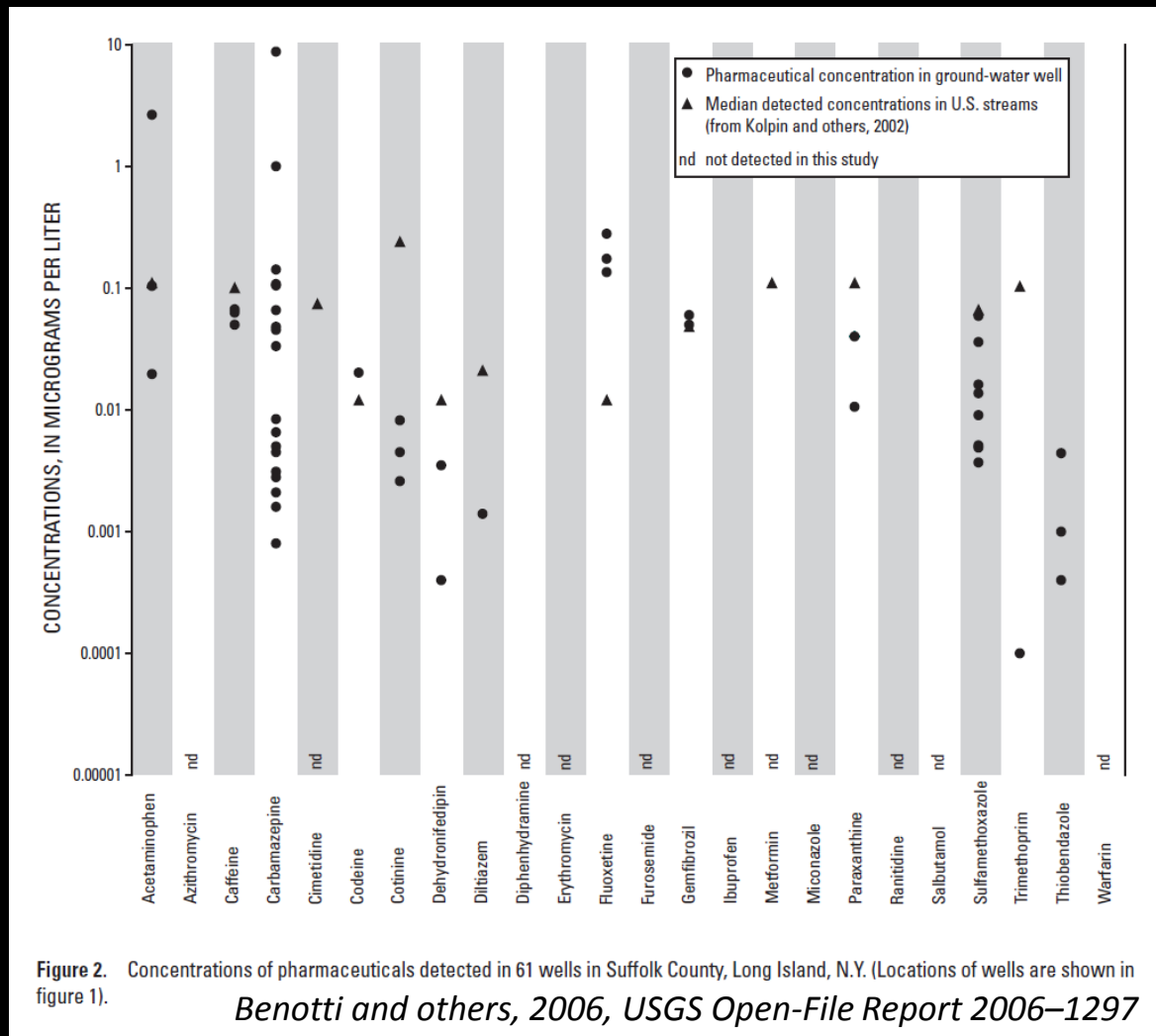


# Groundwater Contaminants: from source to stream



# Emerging contaminants in Suffolk County groundwater

- Data collected between 2002-2005 from upper glacial and shallow Magothy aquifer wells
- Detections of a number of wastewater-indicator compounds at low levels
- Compounds also detected in lakes and stream throughout the country with sources linked to
  - wastewater treatment facilities
  - combined sewer overflows
  - groundwater discharge



# Interpreting Wastewater-derived Emerging Contaminants in the Environment

- Certain wastewater indicator compounds resist degradation in on-site septic systems and wastewater treatment facilities
- Their presence can be correlated to nutrient levels in the shallow groundwater near sources of wastewater
- Affects on water quality in Lake Ronkonkoma is untested—additional samples of groundwater and surface water would provide useful information towards development of TMDLs for the Lake

# Pilot groundwater-quality study at Lake Ronkonkoma

- Snap-shot of potential wastewater influences to Lake Ronkonkoma
- Sampled in summer 2013 and winter 2014
- Shallow water-table samples collected using drive-point piezometer
- Analyses included
  - Nutrients (nitrogen, phosphorus)
  - Wastewater indicators (~60 compounds)
  - Pharmaceuticals (~75 compounds)
  - Fecal Indicator Bacteria (Total coliforms and *E. coli*)
  - Hormones associated with wastewater [archived]
- Data comparable with those from other studies on LI



# Pilot groundwater-quality study at Lake Ronkonkoma

- Groundwater collected on the north and northwest shores of the lake
- Lake Ronkonkoma Groundwater locations
- Groundwater levels
  - LRGW01: 5 feet below surface
  - LRGW02: 9 feet below surface



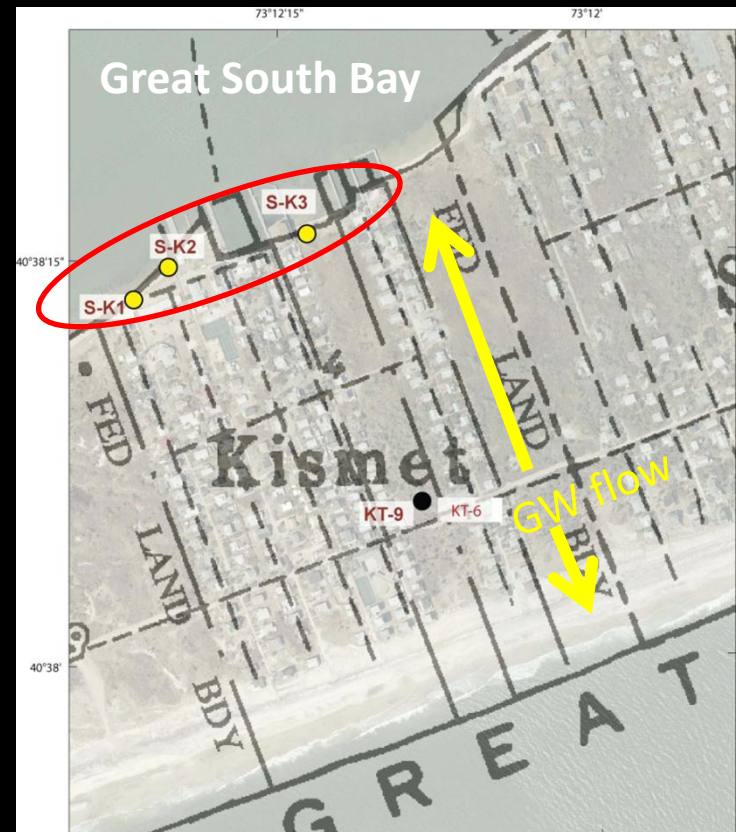
# Pilot groundwater-quality study at Lake Ronkonkoma

2013 PROVISIONAL DATA -- SUBJECT TO REVIEW

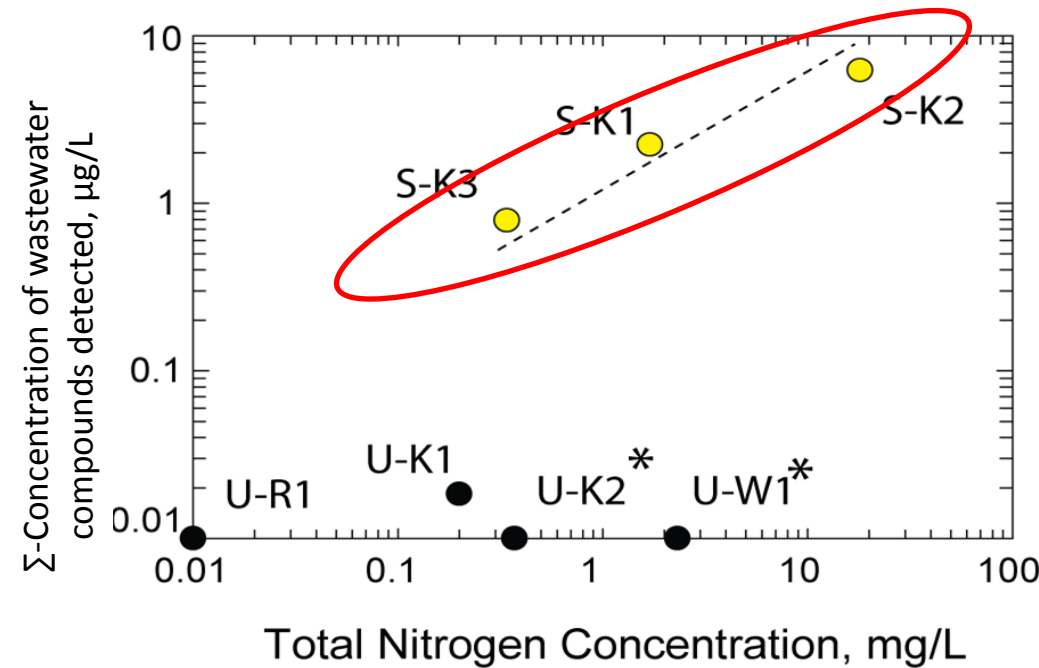
- LRGW01
  - fluconazole; antifungal
  - methyl-1h benzotriazole; deicer, industrial solvent, drug precursor
- LRGW02
  - carbamazepine; an anti-seizure drug
  - meprobamate; an antianxiety drug
- Concentrations of wastewater compounds in the parts-per-trillion to parts-per-billion range

# Case Study: Fire Island National Seashore

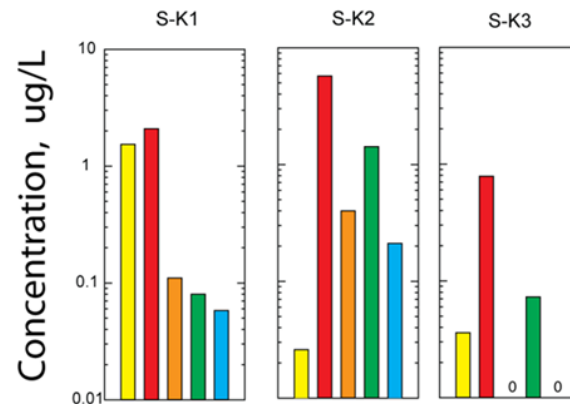
- Are septic systems contributing wastewater compounds and nutrients to the Great South Bay?
- Septic systems are an important source of nutrients to Great South Bay (Schubert, 2009)
- Analogous to Lake Ronkonkoma in source and transport



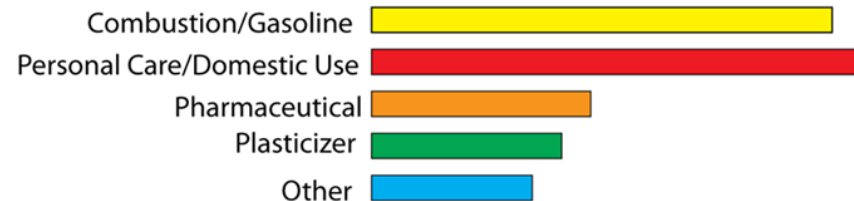
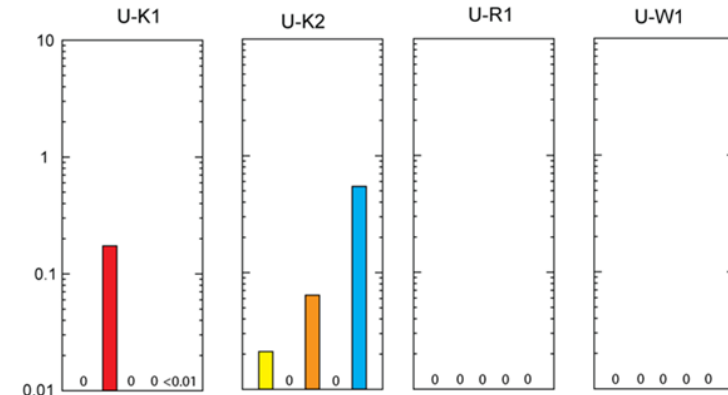
# Case Study: Fire Island National Seashore



## Shoreline Wells



## Upgradient Wells





# Potential Implications of Wastewater-impacted Seepage

- Prolonged nutrient loading can result in eutrophic conditions
- Pathogenic bacteria from human (as well as wildlife) waste will continue to limit lake access for recreation
- Endocrine-disrupting compounds (hormones and hormone-mimicking compounds) could skew fish gender ratios (Duffy and McElroy, 2008)

# Potential Implications of Wastewater-impacted Seepage

- Sulfamethoxazole (an antibiotic)
  - Detected in a number of groundwater wells (Benotti and others, 2006)
  - Shown to reduce rates of denitrification in groundwater (Underwood and others, 2011)
  - Can lead to antibiotic resistance in soil and sediment



# Additional data needed

- Detailed groundwater flow modeling
- Real-time lake level monitoring
- Lake water chemistry
- Groundwater sampling at additional locations along coast

# Contact Info

# Any Questions?

## <http://ny.water.usgs.gov/>

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**USGS**  
science for a changing world

**New York Water Science Center**

home information/data projects publications drought flood nowqa contact internal

**CURRENT STREAMFLOW CONDITIONS IN NY**  
February 24, 2014 10:30 ET

View a detailed map.

**SEARCH THE NY WSC**  
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**QUESTIONS**  
Ask New York USGS

**DATA CENTER**  
NY Water Info by County (NYSWRI)  
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• Streamflow  
• Lakes and Reservoirs  
• Estuaries  
• Groundwater  
• Water quality  
• Precipitation  
Monthly Hydrologic Conditions  
StreamStats for NY  
Zoomable Map of All USGS Sites

Historical data  
• Surface-water  
• Groundwater  
• Water quality  
• Annual Data Reports

WaterWatch  
• Floods/High flows  
• DroughtWatch  
• Groundwater  
• Water Quality  
• Monthly Streamflow

**United States Geological Survey (USGS): Water Resources of New York**

Here you'll find information on New York's rivers, lakes, and estuaries. You'll also find information about groundwater, water quality, and many other topics. The USGS New York Water Science Center operates the most extensive satellite network of stream- and tide-gaging stations in the state, many of which form the backbone of flood-warning systems. The USGS provides current ("real-time") stream stage and surface-water, water quality, and groundwater levels for over 300 sites in New York.

**For emergency situations**, please contact Gary Fieda, Surface Water Specialist at the USGS New York Water Science Center or call our general number (518) 285-5600 and follow the directions to leave voicemail which will be immediately forwarded to a responsible party and responded to as quickly as possible.

Open/Close

**NOTICE October 28, 2013** -- Additional streamgage support secured - But unsupported sites start to shut down Friday November 1st.

Open/Close

**NOTICE September 5, 2013** -- Gage funding secured for selected critical streamgages in 2014.

Open/Close

**NOTICE May 1, 2013** -- Funding dropped for USGS monitoring network in the five boroughs of New York City.

[Hurricane Sandy Information](#)

**New York Water Sciences**

Groundwater Surface Water Water Quality Water Use Maps

**Gages Remain Unfunded**

Open/Close

**NOTICE October 28, 2013** -- Additional streamgage support secured - But unsupported sites start to shut down Friday November 1st.

Open/Close

**NOTICE (03/04/2013)** -- Sequestration may result in streamgage closures.

**Recent Reports**

[National Acid Precitation Assessment Program Report to Congress, 2011: An Integrated Assessment](#)

[USGS New York Water Science Center](#)